ON LOAD TAP CHANGERS

TYPE RSV 9.3

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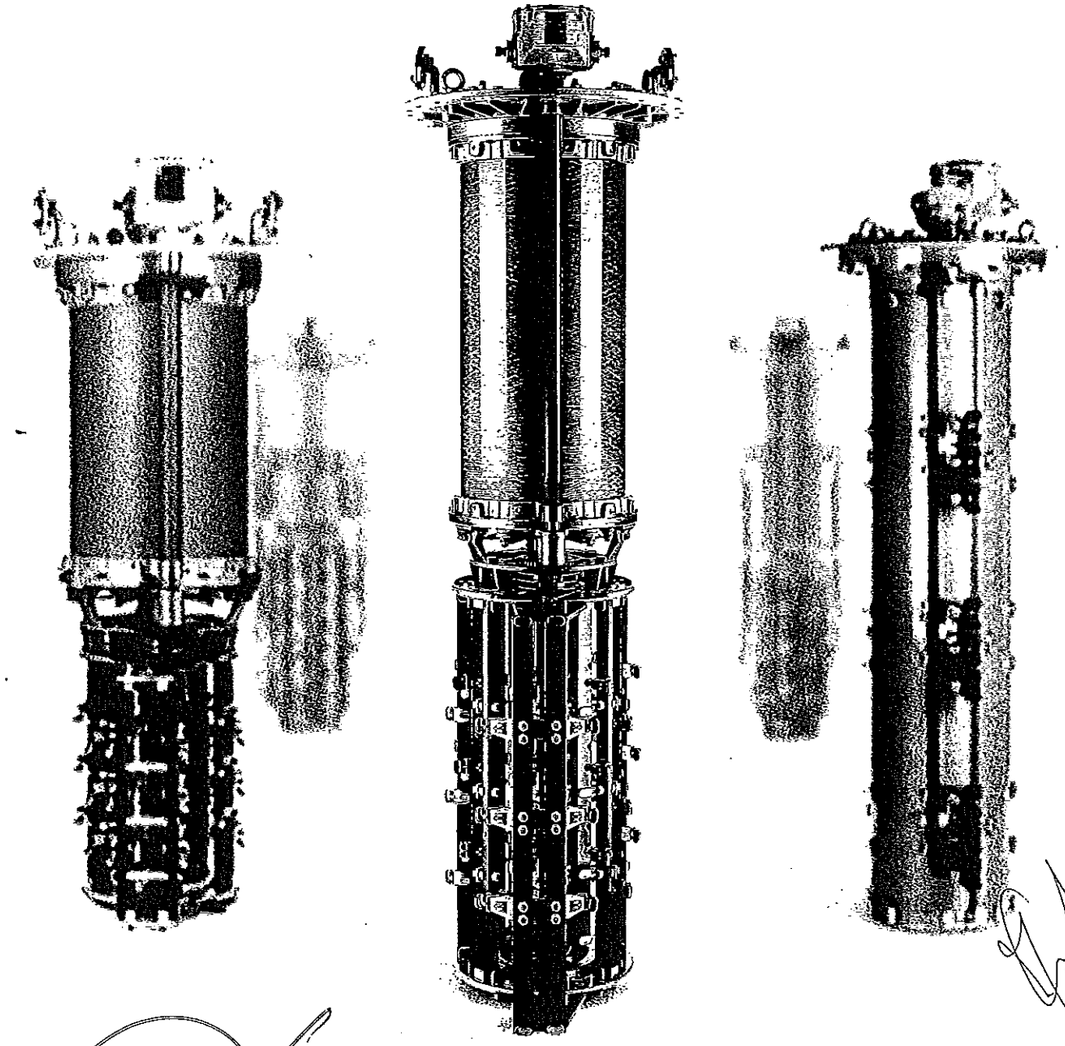

HYUNDAI
HEAVY INDUSTRIES CO. BULGARIA

ON LOAD TAP CHANGERS
RSV 9.3
TECHNICAL DATA

Hyundai Heavy Industries Co. Bulgaria

2017-2

Contents

Notes:

1) This technical data catalog is intended to be used by transformer designers as well as other technical personnel responsible for maintenance, diagnostics and operation of OLTCs.

2) HHI-Bulgaria reserves the right to make changes in the overall dimension drawings and connection diagrams without prior notice. Updated drawings are provided as part of the technical documentation received by the customer at the time of the product delivery; updated drawings can be provided also to potential customers on request.

3) The OLTC is manufactured according to the specific data in the order specification sheet filled in by the client.

4) HHI-Bulgaria is not responsible for the client's improper selection of an OLTC.

1. Basic characteristics

The OLTCs of Hyundai Heavy Industries Co. Bulgaria (HHIB) meet the requirements of the IEC 60214-1 standard.

1.1. Basic technical data

Table 1

OLTC type		RSV 9.3 III – 400	RSV 9.3 III – 550	RSV 9.3 III – 700	RSV 9.3* I – 400	RSV 9.3 I – 550	RSV 9.3 I – 700	RSV 9.3 I – 1200	RSV 9.3 I – 1500
Number of phases and application		3 – in the neutral			1 phase – at any point on the winding				
Maximum rated through current (A)		400	550	700	400	550	700	1200	1500
Short circuit withstand current (kA)	R.m.s. value (3 s duration)	6	8	10	6	8	10	15	15
	Peak value	15	20	25	15	20	25	37,5	37,5
Maximum rated step voltage per phase (V)		3500	3000	3200	3500	3000	3200	3000	2300
Rated step capacity (kVA)		1400	1650	2240	1400	1650	2240	3600	3450
Rated frequency (Hz)		50....60							
Insulation to earth	Highest voltage for equipment Um (kV,r.m.s.) 1)	72.5	123	170	245	300			
	Rated separate source AC withstand voltage, 1min duration (kV, r.m.s.,)	140	230	325	460	460			
	Rated switching impulse withstand voltage (kV, 250/2500 μs)	–	–	–	850	850			
	Rated lighting impulse withstand voltage (kV, 1,2/50 μs)	350	550	750	1050	1050			
Number of operating positions		Without change-over selector – max. of 18 With change-over selector – max. of 35							
Tap selector		Five tap selector sizes (K, L, M, N, P) are available corresponding to the requirements of the voltage stress across the regulating winding. The tap selector insulation level can be chosen independently from the maximum operating voltage to earth. For the test voltages, see Section 1.4.							
Oil pressure in the diverter switch oil compartment		Operating oil pressure up to $0,3x10^5$ Pa (testing pressure – $0,6x10^5$ Pa), Vacuum-proof for drying.							
Siphon for draining the oil from the diverter switch oil compartment		Basic design – left or right							
Drying		In vacuum furnace – up to 110° C In kerosene vapour – up to 125° C							

OLTC type		RSV 9.3 III– 400/550/700				RSV 9.3 I–400/550/700					RSV 9.3 I–1200			RSV 9.3 I– 1500	
Tap selector sizes		K	L	M	N	K	L	M	N	P	L	N	P	L	N
Weight in kg (approximately)		268	272	278	286	218	224	229	235	245	258	273	283	260	275
Displacement volume in dm^3 (approx.)	72,5 kV	168	173	178	188	148	153	158	163	168	170	180	187	172	182
	123 kV	178	183	188	198	158	163	168	173	178	180	190	197	182	192
	170 kV	-	193	198	208	-	183	188	193	198	200	210	227	202	212
	245 kV	-	-	213	223	-	-	208	213	218	220	230	237	222	232
	300 kV	-	-	-	-	-	-	223	228	233	235	245	255	237	247
Oil filling quantity of the diverter switch oil compartment Vs in dm^3 (approx.)	72,5 kV	130				110					130				
	123 kV	140				125					140				
	170 kV	160				140					160				
	245 kV	175				155					175				
	300 kV	185				165					185				

1) In accordance with IEC 60214-1, chapter 3.60 highest effective value for phase-to-phase voltage in a three-phase system for which an on-load tap-changer is designed with respect to its insulation.

* *Suitable for operation in natural esters - Envirotemp FR3 fluid*

Notes: 1. Minimum volume of the conservator, considering the temperature oil expansion when the temperature changes from -30° C to +100° C: $\Delta V = 0,1Vs + 5$ (dm^3).
2. The RSV 9.3 OLTC can operate with a rated load at oil temperature from -25° C to +105° C.

1.2. Rated through current (Iu), rated step voltages (Ui), rated step capacity (PstN)
Table 2 shows the maximum values of Iu, the corresponding step voltage Ui and the rated step capacity PstN.

Table 2: Maximum rated through current (Ium), rated step voltages (Ui), rated step capacity (PstN)

OLTC	RSV 9.3 – III			RSV 9.3 – I				
Ium (A)	400	550	700	400	550	700	1200	1500
Ui (V)	3500	3000	3200	3500	3000	3200	3000	2300
PstN (kVA)	1400	1650	2240	1400	1650	2240	3600	3450

The rated through current Iu and its corresponding rated step voltage Ui are determined by the curve of the rated step capacity (Fig. 1).

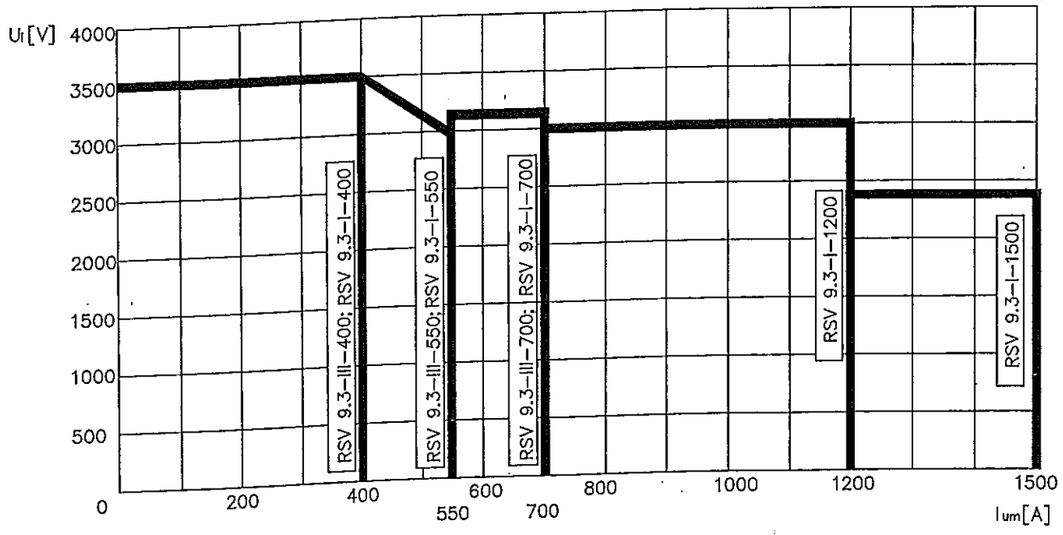

Fig. 1: Step capacities (rated through current Iu [A]; rated step voltages Ui [V])

In case of overexcitation of the transformer, the maximum step voltage can be increased with 10 % under the condition that the step capacity is limited to its rated value.
The specific commutation regimes are clarified in the technical data catalog for all HHIB OLTCs.

1. 3. Electrical and mechanical endurance
Table 3 gives the average values for the number of switching operations till inspection of the diverter switch and replacement of the vacuum interrupter. These values have been obtained as a result of experimenting with real loads under maximum rated through current Ium (A), rated step voltage Ui (V) and cosφ = 1.

Table 3: Electrical and mechanical endurance

OLTC	RSV 9.3 – III , RSV 9.3 – I			RSV9.3 – I	
	400 A	550 A	700 A	1200 A	1500 A
Number of switching operations till inspection	300 000	300 000	250 000	150 000	150 000
Number of switching operations till replacement of vacuum interrupters	600 000	500 000	500 000	500 000	300 000
Mechanical endurance – number of switching operations	1 200 000			800 000	800 000

Detailed information about the number of switching operations till inspection for the different tap changers is given in the RS 9.3/RSV 9.3 Installation and Operation Manual.

1.4. Insulation level
The insulation level of the OLTC is determined by a number of withstand voltage values.
The rated withstand voltage values to earth are given in Table 1. These voltages are determined by national and international standards.
The internal insulation is dimensioned depending on the voltages defined by the transformer winding taps to the different parts of the selector, change-over selector and the diverter switch.
Fig. 2 and 3 show the main connection diagrams and the typical insulation distances to them.
The withstand voltage values from the different insulation distances are given in Table 4. For a correct OLTC selection, these voltage values should correspond to the voltage values that occur during the lightning impulse test, the induced voltage test and the power frequency voltage test of the transformer. The least favorable position of the OLTC should be taken into account.
The insulation to earth and the tap selector insulation size are not mutually connected and can be selected in accordance with the specific requirements.

RSV 9.3 - III - 400/550/700 OLTCs

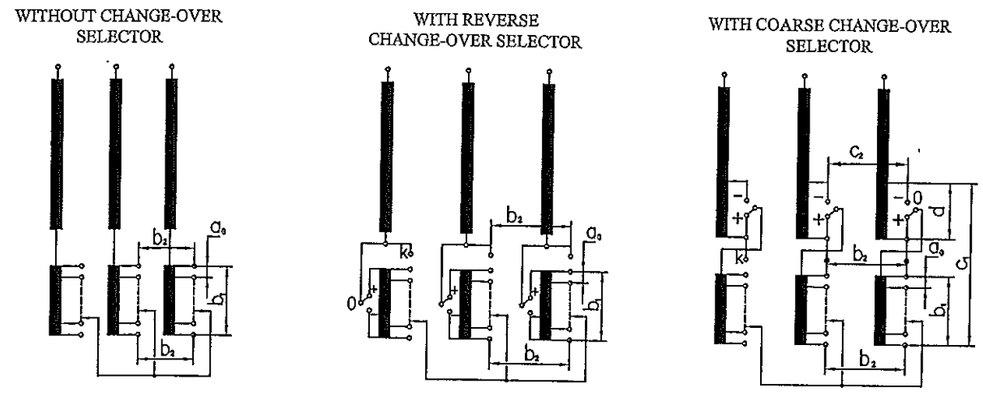

Fig. 2: Insulation distances of the transformer windings

RSV 9.3 - I - 400/550/700/1200/1500 OLTCs

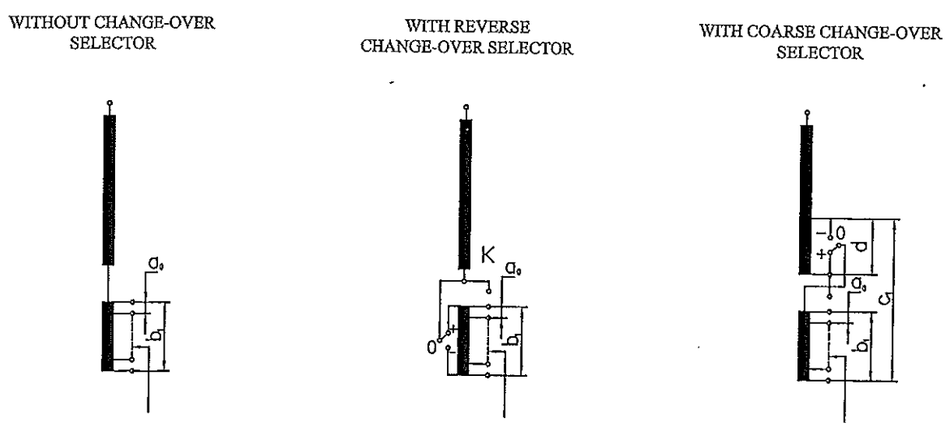

Fig. 3: Insulation distances of the transformer windings

Table 4: Rated withstand voltages

Insulation distances	Rated withstand voltages (kV)									
	Tap selector size – K		Tap selector size – L		Tap selector size – M		Tap selector size – N		Tap selector size – P	
	1,2/50 µs	50 Hz 1min	1,2/50 µs	50 Hz 1min	1,2/50 µs	50 Hz 1min	1,2/50 µs	50 Hz 1min	1,2/50 µs	50 Hz 1min
a_0	100	25	120	35	130	40	130	40	140	40
b_1	230	55	290	80	340	100	410	120	490	140
b_2	230	55	290	80	340	100	410	120	490	140
c_1	290	65	390	120	450	130	520	150	-	-
c_2	290	65	390	120	450	130	520	150	-	-
d	290	80	290	80	410	120	410	120	490	140

2. Review of the RSV 9.3 types

2.1. Main dimensions[1)]

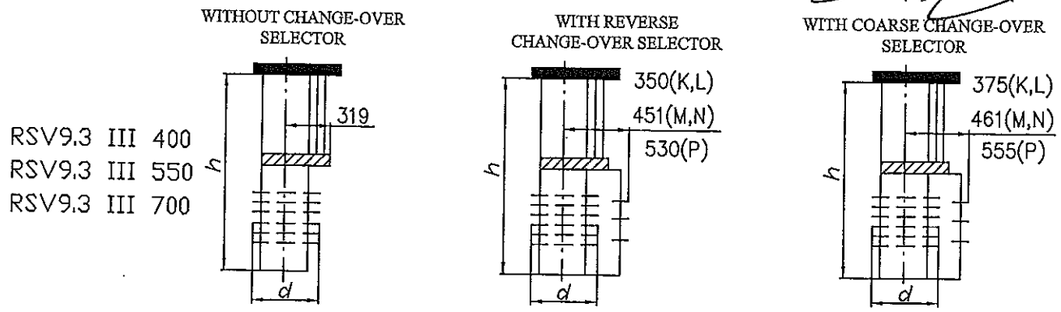

Fig. 4: RSV 9.3 – III

Table 5: RSV 9.3 – III

Um	Insulation level of the selector									
	K		L		M		N		P	
	h	d	h	d	h	d	h	d	h	d
72.5 kV	1741	386	1896	386	2011	480	2201	480	2514	558
123 kV	1791	386	1946	386	2061	480	2251	480	2564	558
170 kV	-	-	2102	386	2217	480	2407	480	2720	558
245 kV	-	-	-	-	2317	480	2507	480	2820	558

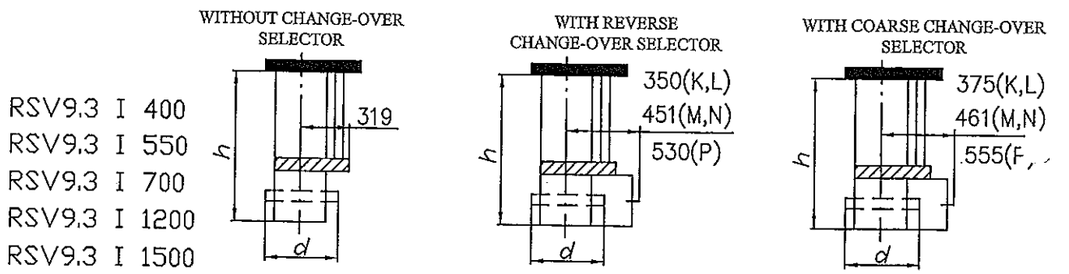

Fig.5: RSV 9.3 – I

Table 6: RSV 9.3 – I

Um	Insulation level of the selector									
	K		L		M		N		P	
	h	d	h	d	h	d	h	d	h	d
72.5 kV	1202	386	1297	386	1352	480	1462	480	1695	558
123 kV	1401	386	1496	386	1551	480	1661	480	1894	558
170 kV	-	-	1596	386	1651	480	1761	480	1994	558
245	-	-	-	-	1751	480	1861	480	2094	558

1) For the rest of the dimensions see appendices

2.2 Number of steps and basic connection diagrams

Fig. 6, 6a and 6b show the basic connection diagrams where the selector contacts are designated according to the overall dimension drawings.

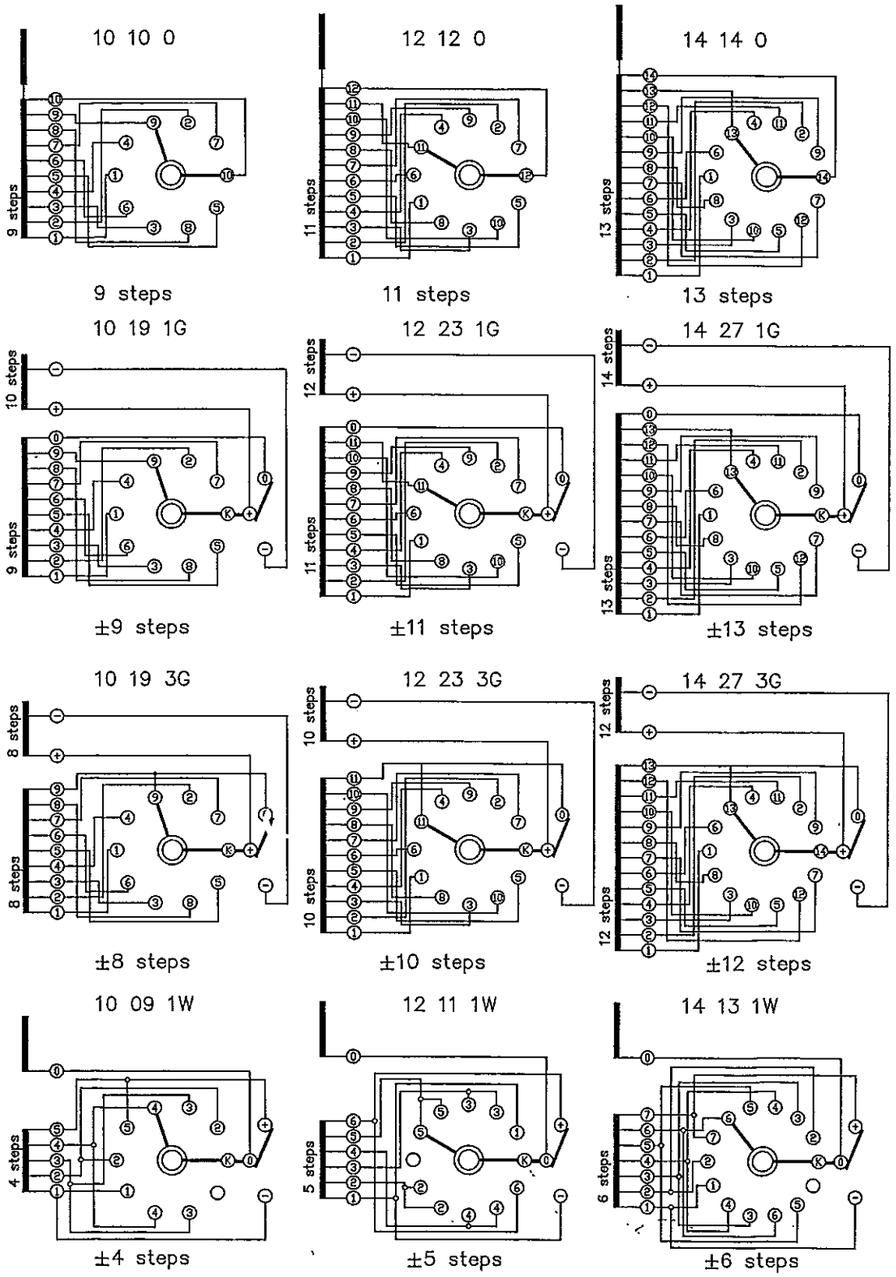

Fig. 6: Basic connection diagrams

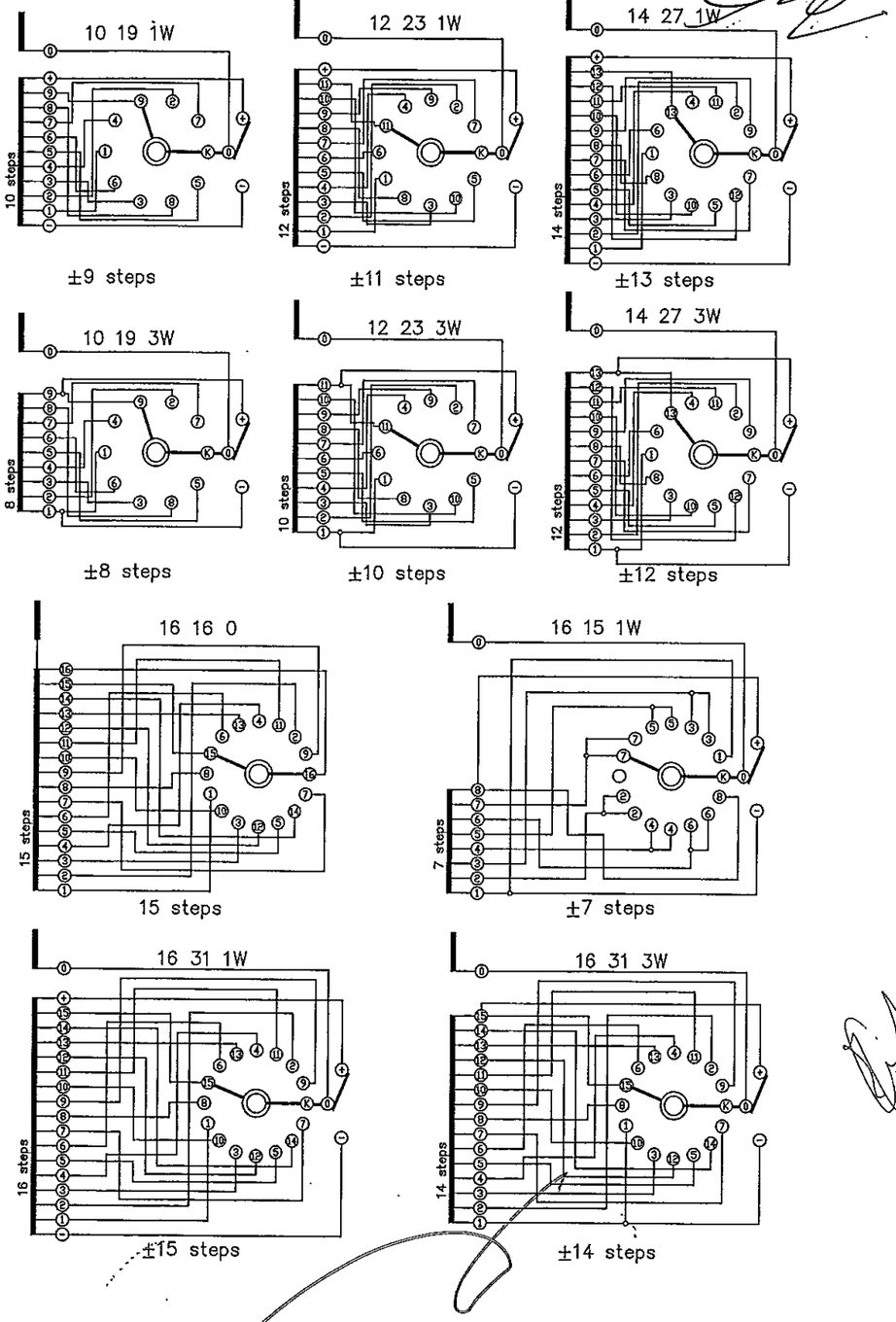

Fig. 6a: Basic connection diagrams

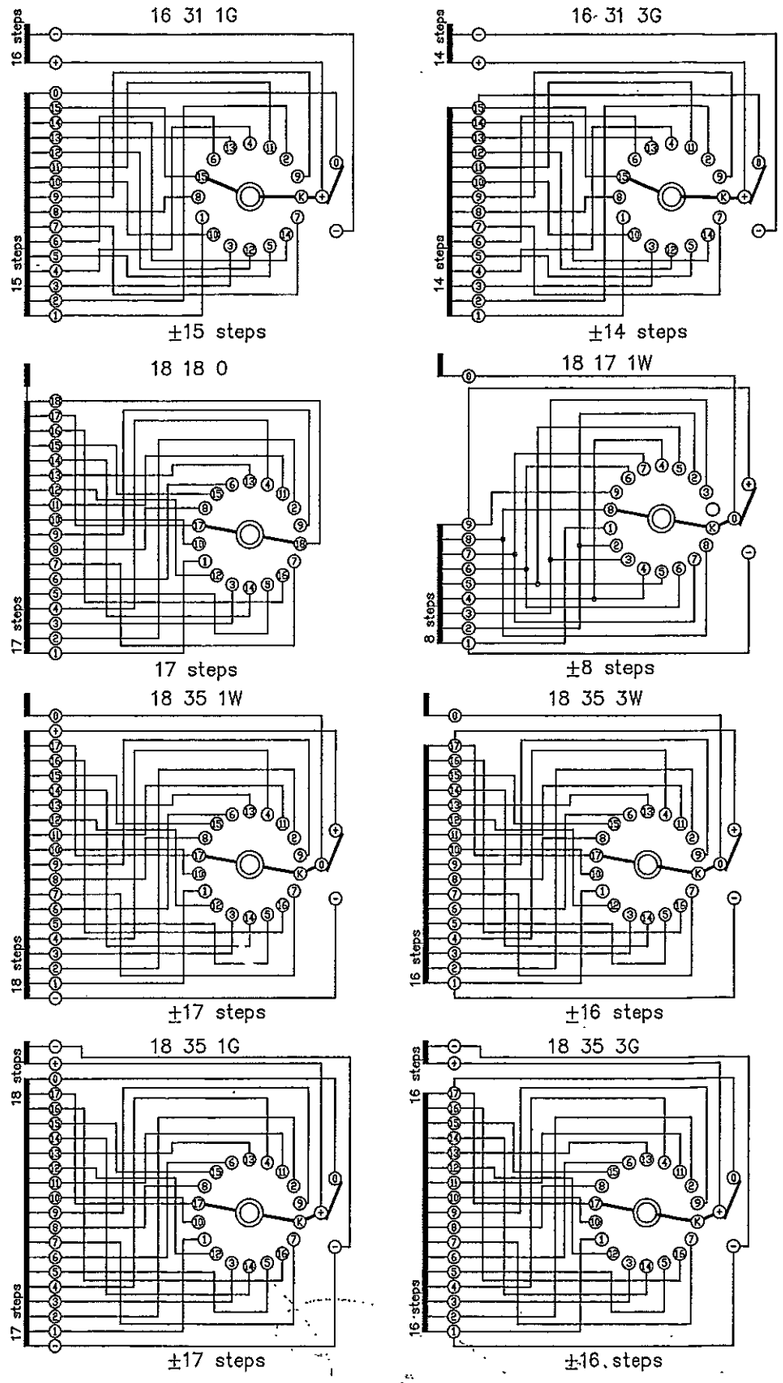

Fig. 6b: Basic connection diagrams

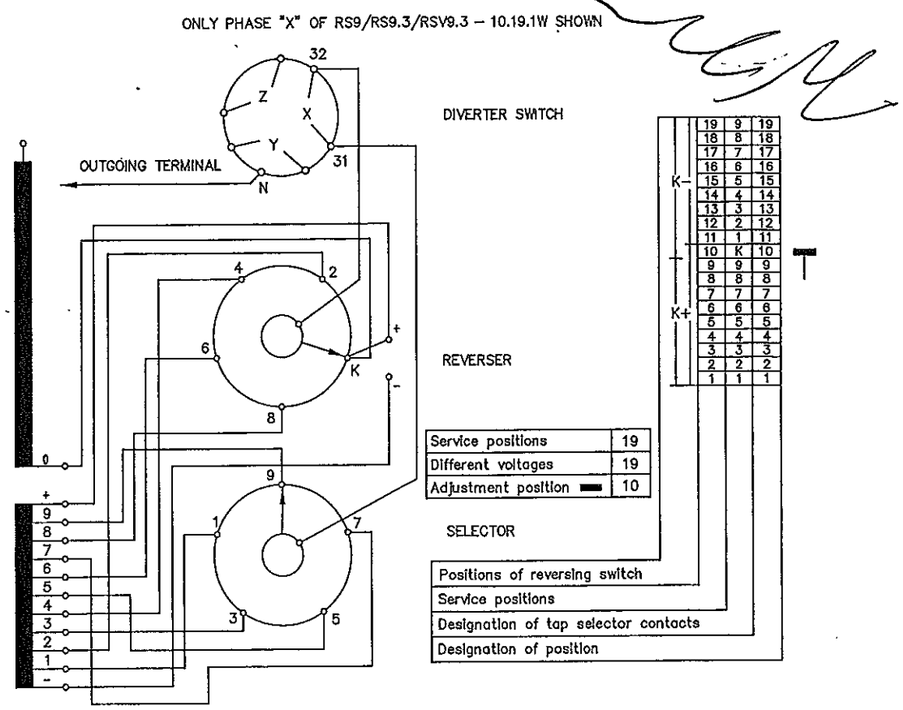

Fig. 7: Basic connection diagram 10 19 1W

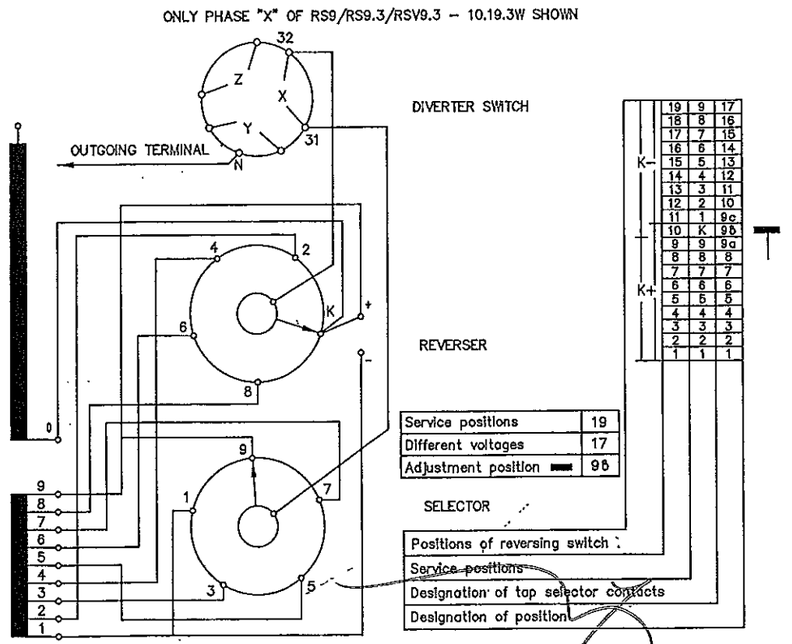

Fig. 8: Basic connection diagram 10 19 3W

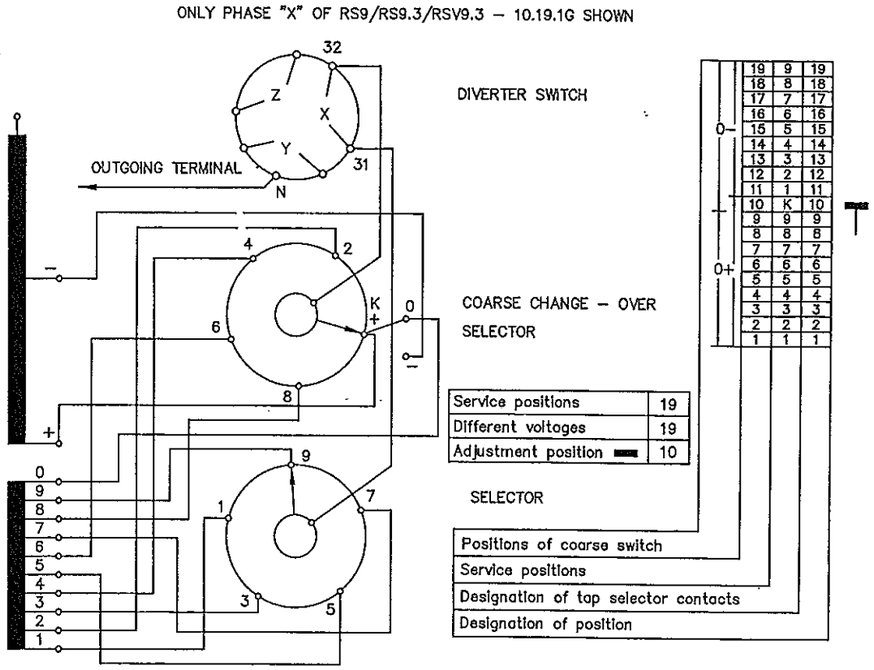

Fig. 9: Basic connection diagram 10 19 1G

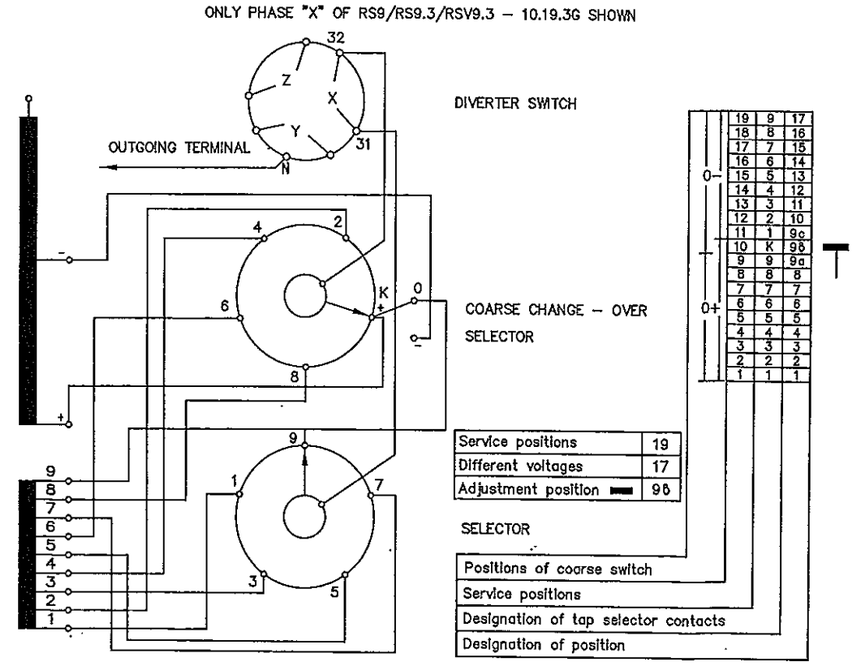

Fig. 10: Basic connection diagram 10 19 3G

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3. Appendices

3.1. Overall dimension drawings of OLTCs

RSV 9.3 – III – 400/550/700	№1075
RSV 9.3 – III – 400/550/700-P	№1078
RSV 9.3 – I – 400/550/700	№1074
RSV 9.3 – I – 400/550/700-P	№1079
RSV 9.3 – II – 400/550/700	№1076
RSV 9.3 – I – 1200	№1077
RSV 9.3 – I – 1200 245/P-10.19.3 W	№1080
RSV 9.3 – I – 1500	№1084
OLTCs with pressure relief device and tie-in resistors	№310Q
OLTCs RS 9.3 /RSV 9.3 flange's configuration	№999

3.2. Additional drawings of OLTCs

RS 9.3/RSV 9.3 – III – 10, 12, 14 – arrangement of the selector contacts	№374
RS 9.3/RSV 9.3 – III – 16, 18 – arrangement of the selector contacts	№375
RS 9.3/RSV 9.3 – I – 10, 12, 14 – arrangement of the selector contacts	№376
RS 9.3/RSV 9.3 – I – 16, 18 – arrangement of the selector contacts	№377

3.3. OLTC type RS 9.3 – driving shafts arrangement №2093

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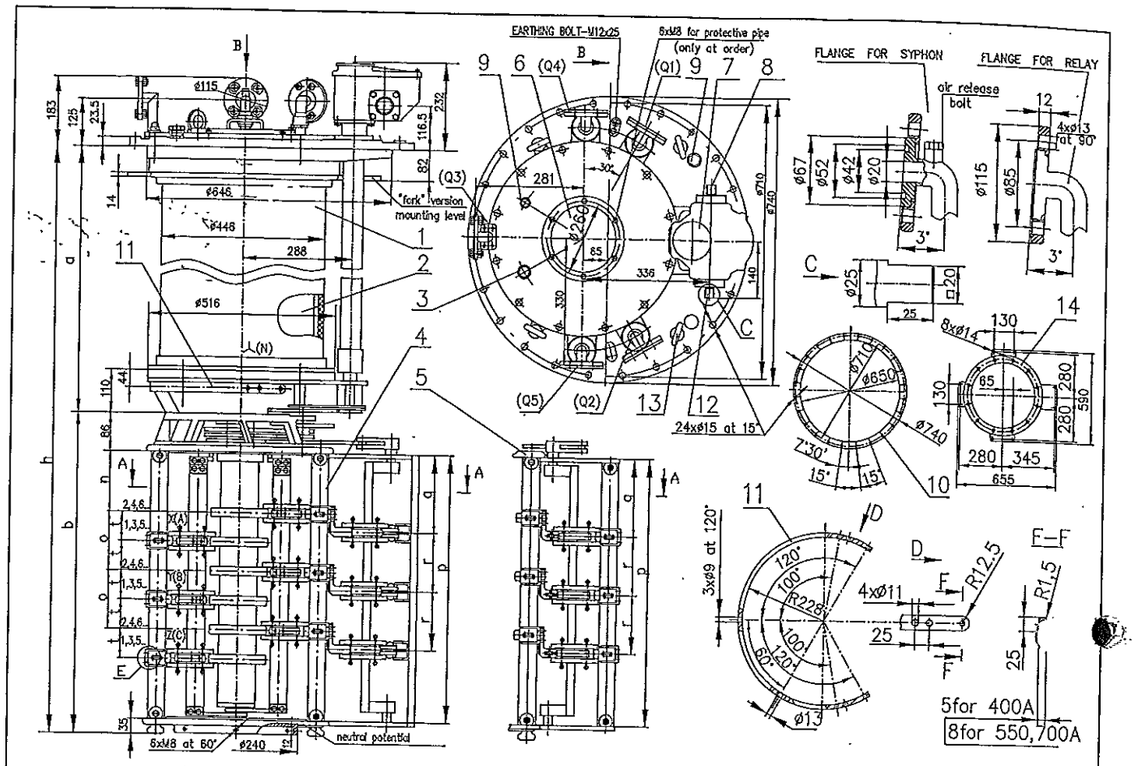
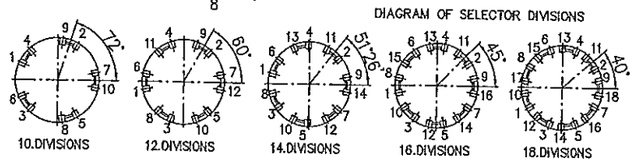


DWG.1 (Coarse change-over selector)

DWG.2 (Reverser) (for the rest see dwg.1)

DIAGRAM OF SELECTOR DIVISIONS



1. Diverter switch oil vessel
2. Diverter switch
3. Opening for temperature sensor
4. Selector with coarse change-over selector
5. Selector with reverser
6. Protective membrane
7. Position indicator
8. Incoming shaft at right side driving
9. Bleeding of the OLTC
10. Disposal of the openings for fixing to the transformer tank
11. Disposal of the outgoing terminal (neutral)
12. Incoming shaft at left side driving
13. Lifting hook 4xø35 mm
14. Disposal of the openings for "fork" mounting

NOTE: 1) Horisontal dimensions of "K" and "L" (16,18 div.) are some as selector sizes "M" and "N"
2) We are offering OLTC's without change-over selector
3) Additional information about Q1,Q2,Q3,Q4,Q5: dwg. N°999

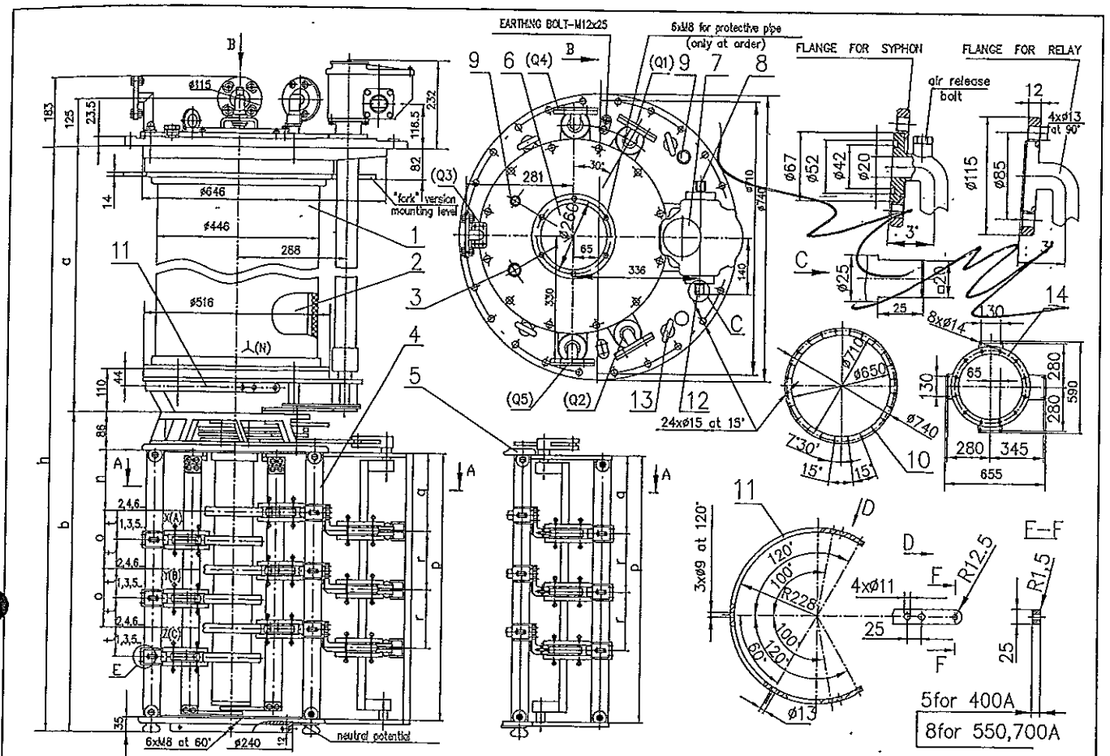
	RSV9.3 III 400–72.5...123/K		RSV9.3 III 400–72.5...170/L			RSV9.3 III 400–72.5...245/M				RSV9.3 III 400–72.5...245/N			
	RSV9.3 III 550–72.5...123/K		RSV9.3 III 550–72.5...170/L			RSV9.3 III 550–72.5...245/M				RSV9.3 III 550–72.5...245/N			
	RSV9.3 III 700–72.5...123/K		RSV9.3 III 700–72.5...170/L			RSV9.3 III 700–72.5...245/M				RSV9.3 III 700–72.5...245/N			
	Number of contacts per phase 10,12,14,16,18												
	Um (insulation to Earth) in kV												
	72.5	123	72.5	123	170	72.5	123	170	245	72.5	123	170	245
h	1741	1791	1896	1946	2102	2011	2061	2217	2317	2201	2251	2407	2507
a	1090	1140	1090	1140	1296	1090	1140	1296	1396	1090	1140	1296	1396
b	851		806			921				1111			
n	115		155			175				220			
o	120		150			180				220			
t	60		75			90				110			
D	386 1)		386 1)			480				480			
D1	400		400			498				498			
f	575		575			710				710			
c	550		550			700				700			
p	540		695			810				1000			
q	145		192.5			220				275			
r	120		150			180				220			
g	294		294			377.5				377.5			
m	65		65			80				80			
l	138		138			169				169			
k	140		140			185				185			
α	35°		35°			30°				30°			
G	250÷260 kg		254÷264 kg			258÷270 kg				264÷278 kg			

HYUNDAI HEAVY INDUSTRIES CO. BULGARIA

ON LOAD TAP CHANGER
RSV 9.3 – III – 400, 550, 700

№ 1075

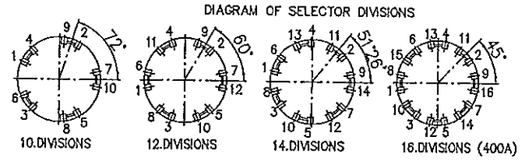
2017



DWG.1 (Coarse change-over selector)

DWG.2 (Reverser) (for the rest see dwg.1)

DIAGRAM OF SELECTOR DIVISIONS



1. Diverter switch oil vessel
2. Diverter switch
3. Opening for temperature sensor
4. Selector with coarse change-over selector
5. Selector with reverser
6. Protective membrane
7. Position indicator
8. Incoming shaft at right side driving
9. Bleeding of the OLTC
10. Disposal of the openings for fixing to the transformer tank
11. Disposal of the outgoing terminal (neutral)
12. Incoming shaft at left side driving
13. Lifting hook 4xø35 mm
14. Disposal of the openings for "fork" mounting

NOTE: 1) We are offering OLTC's without change-over selector
2) Additional information about Q1,Q2,Q3,Q4,Q5: dwg. N°999
3) Selectors with 16 divisions are used only for currents of 400A

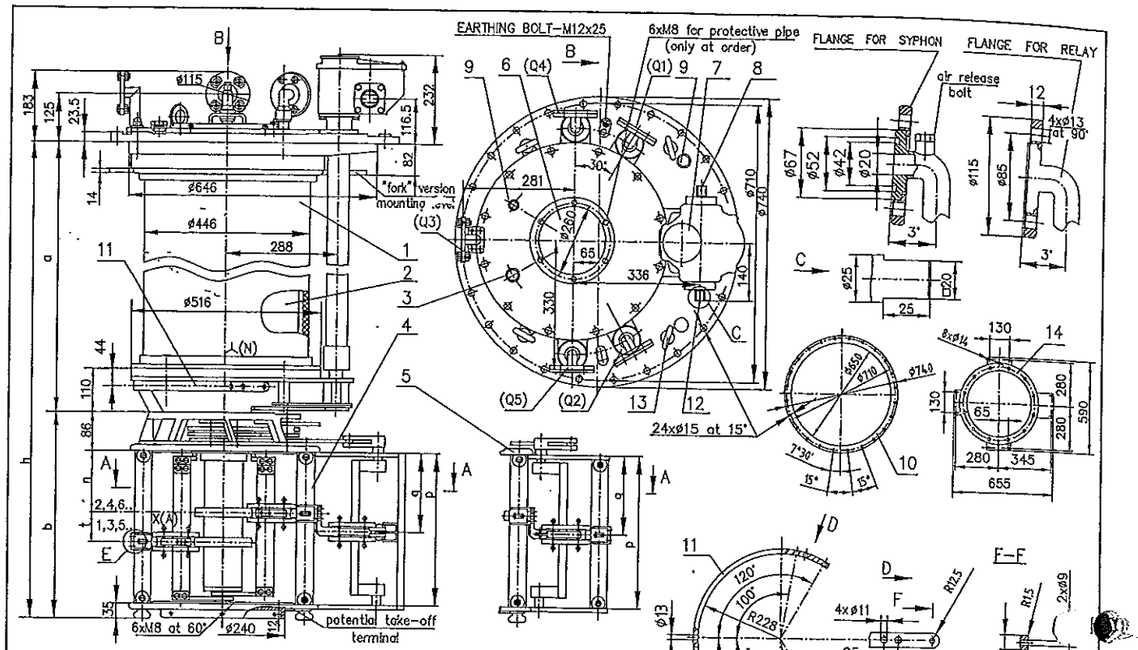
	RSV9.3 III 400–72.5...245/P			
	RSV9.3 III 550–72.5...245/P			
	RSV9.3 III 700–72.5...245/P			
	Number of contacts per phase 10,12,14,16			
	Um (insulation to Earth) in kV			
	72.5	123	170	245
h	2514	2564	2720	2820
a	1090	1140	1296	1396
b	1424			
n	275			
o	300			
t	150			
D	558			
D1	573			
f	830			
c	820			
p	1296			
q	306			
r	300			
g	460			
m	107			
l	196			
k	238			
α	36°			
G	285÷305 kg			

HYUNDAI HEAVY INDUSTRIES CO. BULGARIA

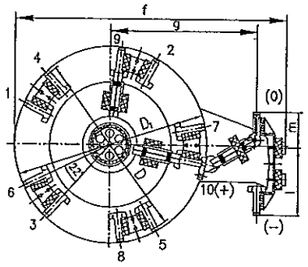
ON LOAD TAP CHANGERS
RSV 9.3 – III – 400, 550, 700/P

№ 1078

2017

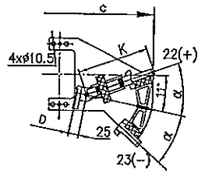


DWG.1 (Coarse change-over selector)



DWG.2 (Reverser)

(for the rest see dwg.1)



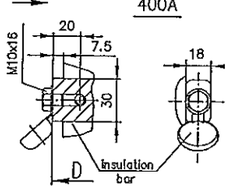
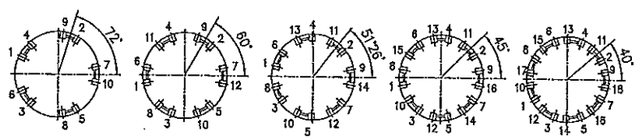


DIAGRAM OF SELECTOR DIVISIONS



10.DIVISIONS 12.DIVISIONS 14.DIVISIONS 16.DIVISIONS 18.DIVISIONS

1. Diverter switch oil vessel
2. Diverter switch
3. Opening for temperature sensor
4. Selector with coarse change-over selector
5. Selector with reverser
6. Protective membrane
7. Position indicator
8. Incoming shaft at right side driving
9. Bleeding of the OLTC
10. Disposal of the openings for fixing to the transformer tank
11. Current take-off terminal
12. Incoming shaft at left side driving
13. Lifting hook 4xø35 mm
14. Disposal of the openings for "fork" mounting

NOTE: 1) Horisontal dimensions of "K" and "L" (16,18 div.) are same as selector sizes "M" and "N"
2) We are offering OLTC's without change-over selector
3) Additional information about Q1,Q2,Q3,Q4,Q5: dwg. N°999

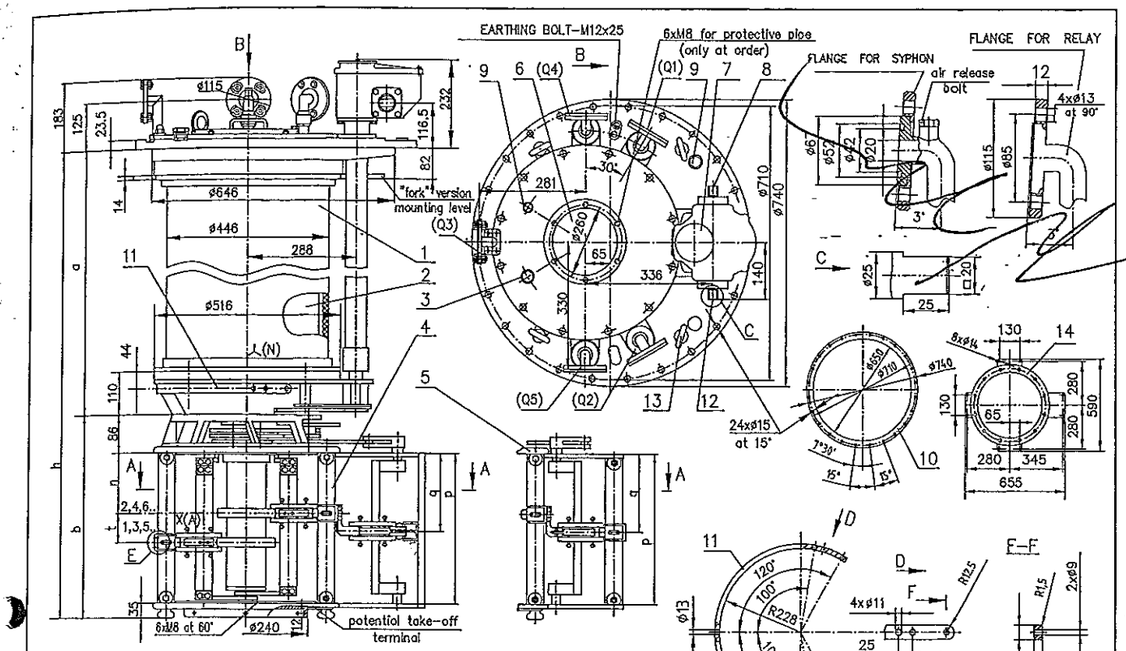
	RSV9.3 I 400–72.5...123/K		RSV9.3 I 400–72.5...170/L			RSV9.3 I 400–72.5...245/M				RSV9.3 I 400–72.5...245/N			
	RSV9.3 I 550–72.5...123/K		RSV9.3 I 550–72.5...170/L			RSV9.3 I 550–72.5...245/M				RSV9.3 I 550–72.5...245/N			
	RSV9.3 I 700–72.5...123/K		RSV9.3 I 700–72.5...170/L			RSV9.3 I 700–72.5...245/M				RSV9.3 I 700–72.5...245/N			
	Number of contacts per phase 10,12,14,16,18												
	Um (insulation to Earth) in kV												
	72.5	123	72.5	123	170	72.5	123	170	245	72.5	123	170	245
h	1202	1401	1297	1496	1596	1352	1551	1651	1751	1452	1651	1751	1851
a	791	990	791	990	1090	791	990	1090	1190	791	990	1090	1190
b	411		506			561				671			
n	115		155			175				220			
t	60		75			90				110			
D	3861)		3861)			480				480			
D1	400		400			498				498			
f	575		575			710				710			
c	550		550			700				700			
p	300		395			450				560			
q	145		192.5			220				275			
g	294		294			377.5				377.5			
m	65		65			80				80			
l	138		138			169				169			
k	140		140			185				185			
α	35°		35°			30°				30°			
G	203÷210 kg		208÷216 kg			212÷221 kg				217÷227 kg			

HYUNDAI HEAVY INDUSTRIES CO. BULGARIA

ON LOAD TAP CHANGERS
RSV 9.3 – I – 400, 550, 700

№ 1074

2017



DWG.1 (Coarse change-over selector)

DWG.2 (Reverser)

(for the rest see dwg.1)

DIAGRAM OF SELECTOR DIVISIONS

10.DIVISIONS 12.DIVISIONS 14.DIVISIONS 16.DIVISIONS(400A)

1. Diverter switch oil vessel
2. Diverter switch
3. Opening for temperature sensor
4. Selector with coarse change-over selector
5. Selector with reverser
6. Protective membrane
7. Position indicator
8. Incoming shaft at right side driving
9. Bleeding of the OLTC
10. Disposal of the openings for fixing to the transformer tank
11. Current take-off terminal
12. Incoming shaft at left side driving
13. Lifting hook 4xø35 mm
14. Disposal of the openings for "fork" mounting

NOTE: 1) We are offering OLTC's without change-over selector
2) Additional information about Q1,Q2,Q3,Q4,Q5: dwg. N°999
3) Selectors with 16 divisions are used only for currents of 400A

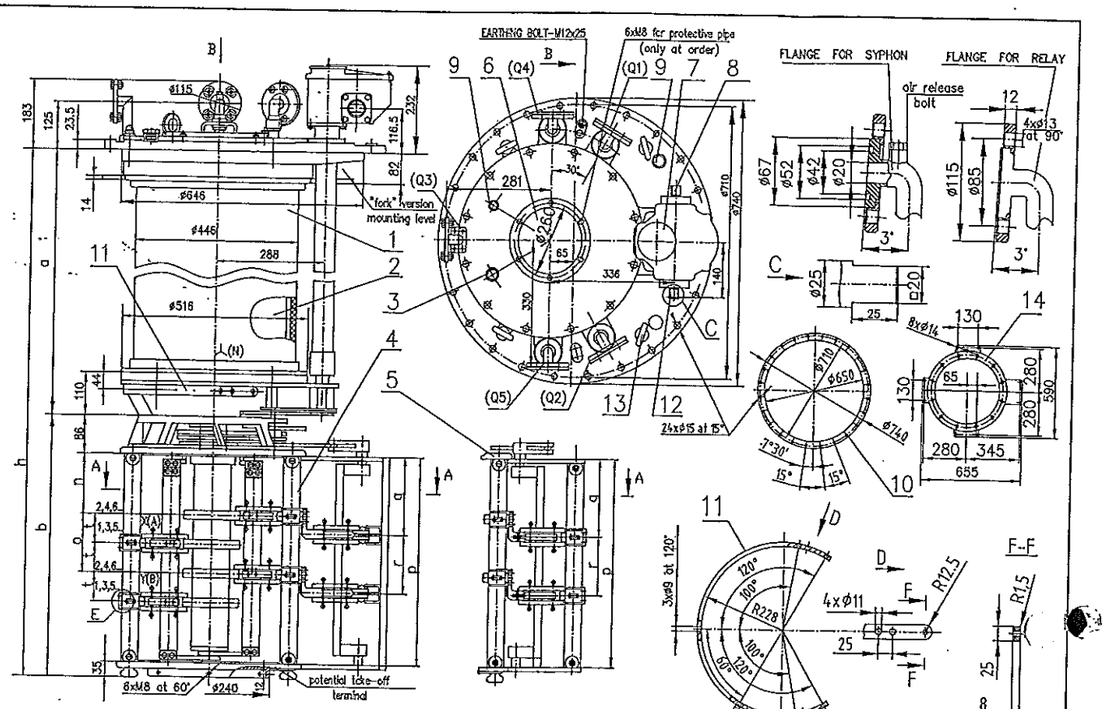
	RSV9.3 I 400–72.5...245/P			
	RSV9.3 I 550–72.5...245/P			
	RSV9.3 I 700–72.5...245/P			
	Number of contacts per phase 10,12,14,16			
	Um (insulation to Earth) in kV			
	72.5	123	170	245
h	1695	1894	1994	2094
a	791	990	1090	1190
b	904			
n	300			
t	180			
D	558			
D1	573			
f	830			
c	820			
p	776			
q	331			
g	460			
m	107			
l	196			
k	238			
α	36°			
G	230÷245 kg			

HYUNDAI HEAVY INDUSTRIES CO. BULGARIA

ON LOAD TAP CHANGERS
RSV 9.3 – I – 400, 550, 700/P

№ 1075

2017



DWG.1 (Coarse change-over selector)

DWG.2 (Reverser)
(for the rest see dwg.1)

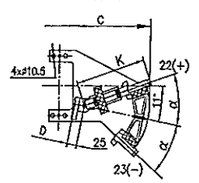
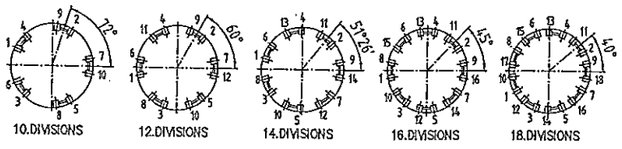


DIAGRAM OF SELECTOR DIVISIONS

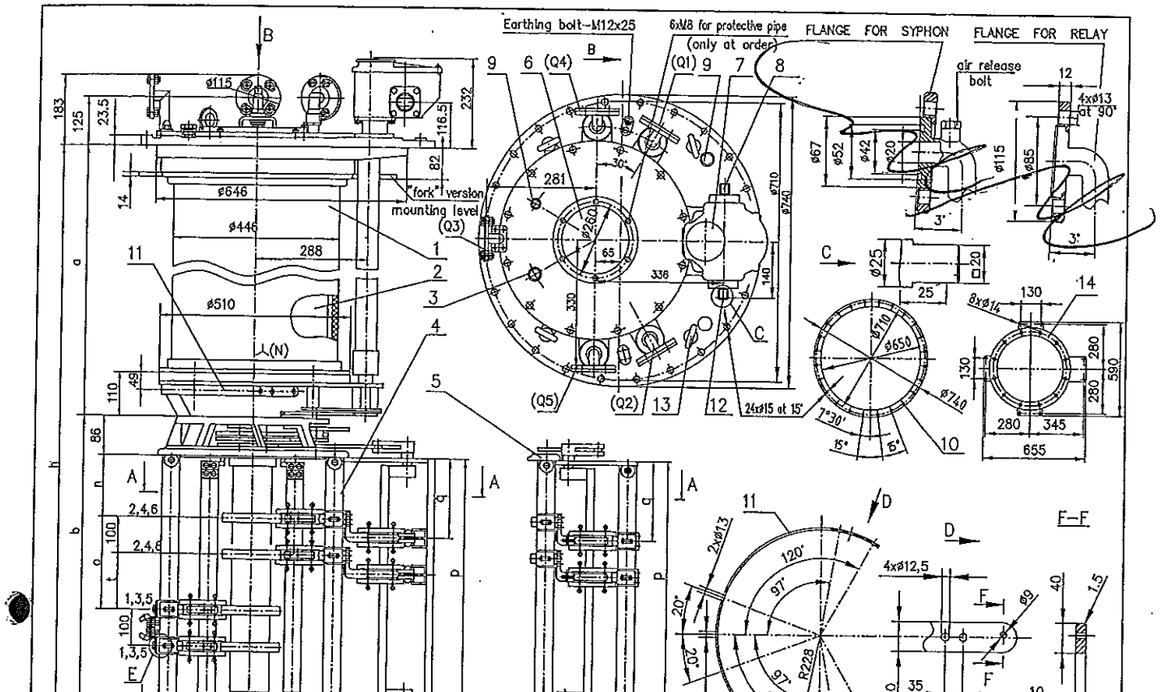


1. Diverter switch oil vessel
2. Diverter switch
3. Opening for temperature sensor
4. Selector with coarse change-over selector
5. Selector with reverser
6. Protective membrane
7. Position indicator
8. Incoming shaft at right side driving
9. Bleeding of the OLTC
10. Disposal of the openings for fixing to the transformer tank
11. Current take-off terminal
12. Incoming shaft at left side driving
13. Lifting hook 4xø35 mm
14. Disposal of the openings for "fork" mounting

NOTE: 1) Horisontal dimensions of "K" and "L" (16,18 div.) are same as selector sizes "M" and "N".
2) We are offering OLTC's without change-over selector
3) Additional information about Q1,Q2,Q3,Q4,Q5: dwg. N°999

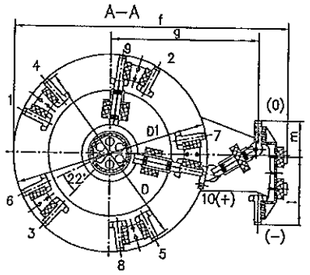
	RSV9.3 II 400-72.5...123/K		RSV9.3 II 400-72.5...170/L			RSV9.3 II 400-72.5...245/N			
	RSV9.3 II 550-72.5...123/K		RSV9.3 II 550-72.5...170/L			RSV9.3 II 550-72.5...245/N			
	RSV9.3 II 700-72.5...123/K		RSV9.3 II 700-72.5...170/L			RSV9.3 II 700-72.5...245/N			
	Number of contacts per phase 10,12,14,16,18								
	Um (insulation to Earth) in kV								
	72.5	123	72.5	123	170	72.5	123	170	245
h	1621	1671	1746	1796	1896	1831	1881	1981	2113
a	1090	1140	1090	1140	1240	1090	1140	1240	1372
b	531		656			741			891
n	115		155			175			220
o	120		150			180			220
t	60		75			90			110
D	386 1)		386 1)			480			480
D1	400		400			498			498
f	575		575			710			710
c	550		550			700			700
p	420		545			630			780
q	145		192.5			220			275
r	120		150			180			220
g	294		294			377.5			377.5
m	65		65			80			80
l	138		138			169			169
k	140		140			185			185
α	35°		35°			30°			30°
G	223÷230 kg		228÷238 kg			232÷241 kg			237÷247 kg

HYUNDAI HEAVY INDUSTRIES CO. BULGARIA	ON LOAD TAP CHANGERS RSV 9.3 – II – 400, 550, 700	№ 1076
		2017



DWG.1 (Coarse change-over selector)

DWG.2 (Reverser)
(for the rest see dwg.1)



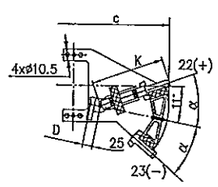
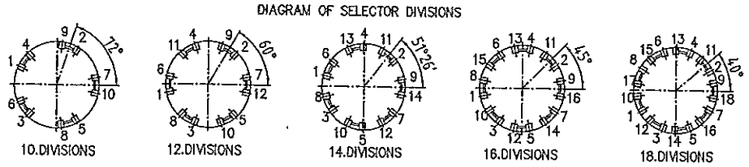
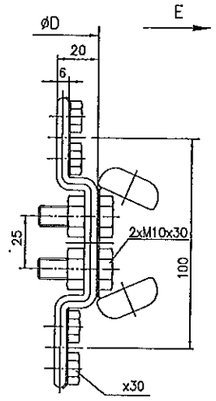


DIAGRAM OF SELECTOR DIVISIONS



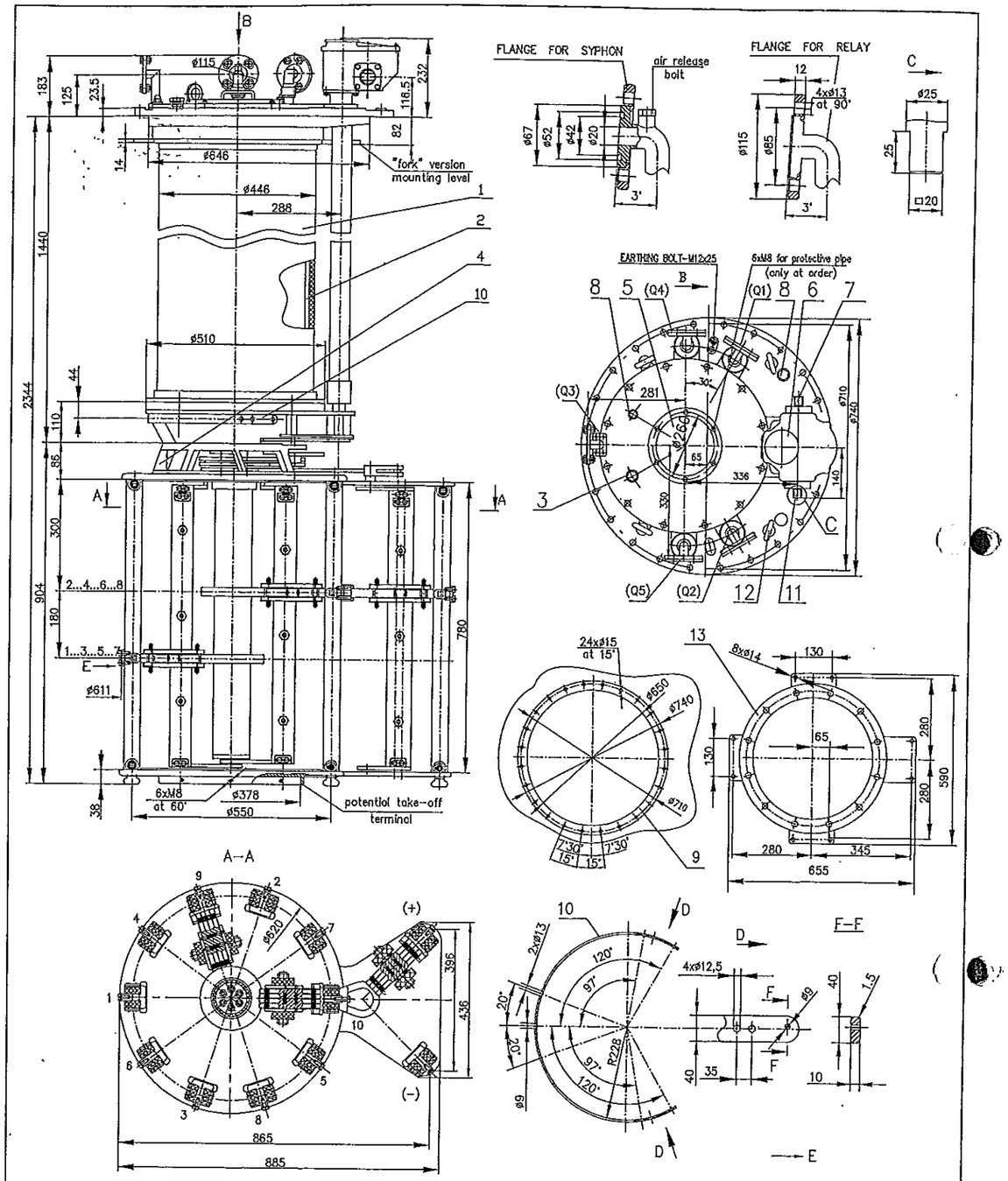


1. Diverter switch oil vessel
2. Diverter switch
3. Opening for temperature sensor
4. Selector with coarse change-over selector
5. Selector with reverser
6. Protective membrane
7. Position indicator
8. Incoming shaft at right side driving
9. Bleeding of the OLTC
10. Disposal of the openings for fixing to the transformer tank
11. Current take-off terminal
12. Incoming shaft at left side driving
13. Lifting hook 4xø35 mm
14. Disposal of the openings for "fork" mounting

NOTE: 1) Additional information about Q1,Q2,Q3,Q4,Q5: dwg. N°999
2) We are offering OLTC's without change-over selector
3) Horisontal dimensions of "L" (16,18 div.) are same as selector sizes "N".

	RSV9.3 – I – 1200 72.5...245/L				RSV9.3 – I – 1200 72.5...245/N			
	Number of contacts per phase 10,12,14,16,18							
	Um (insulation to Earth) in kV							
	72.5	123	170	245	72.5	123	170	245
h	1747	1796	1946	2146	1912	1961	2111	2311
a	1041	1090	1240	1440	1041	1090	1240	1440
b	706				871			
n	155				220			
o	175				210			
t	75				110			
D	426				520			
D1	400				498			
f	575				710			
c	570				720			
p	595				760			
q	192.5				275			
g	294				377.5			
m	85				100			
l	158				189			
k	160				205			
α	35°				30°			
G	240 ÷ 250 kg				250 ÷ 260 kg			

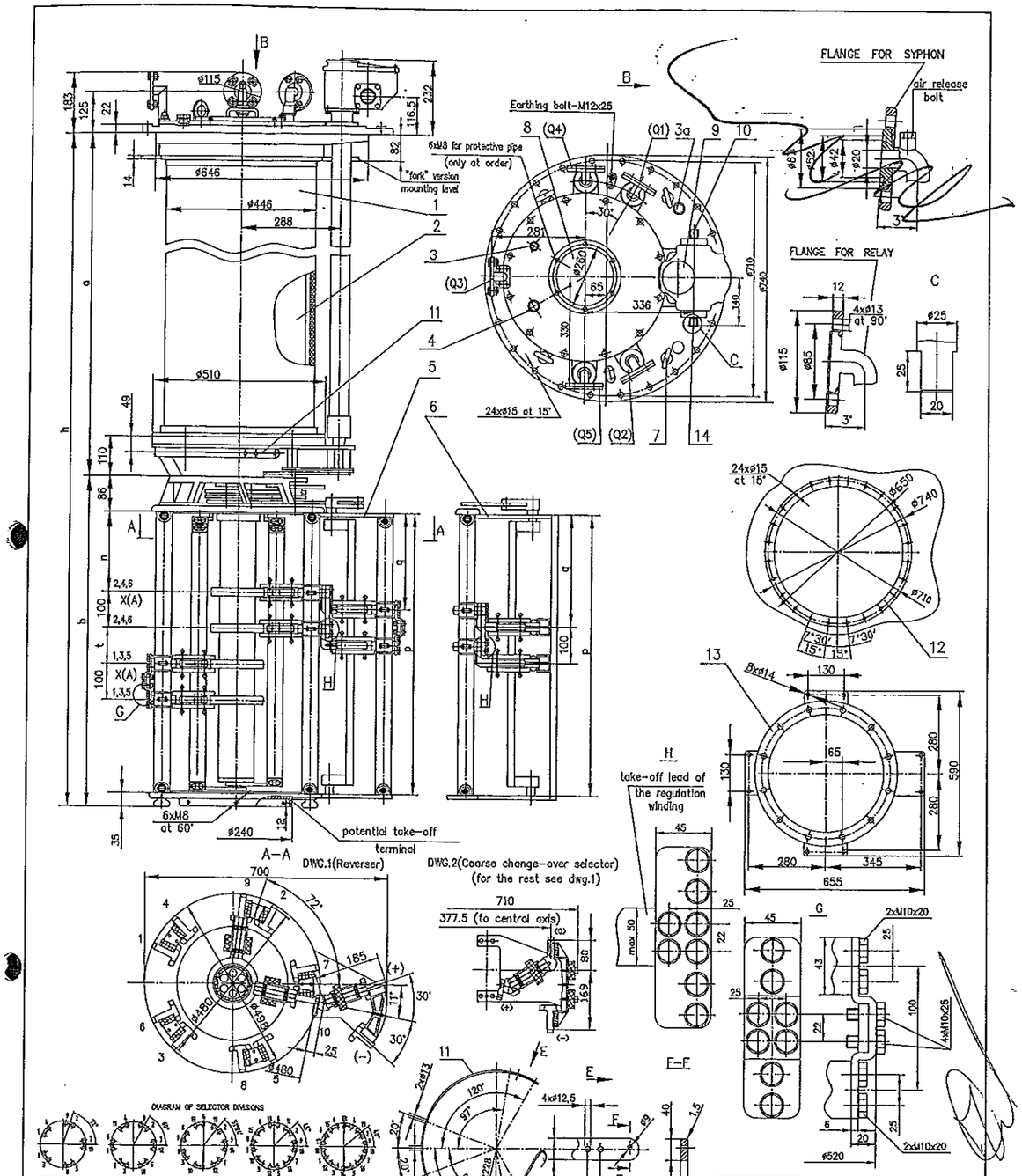
HYUNDAI HEAVY INDUSTRIES CO. BULGARIA	ON LOAD TAP CHANGERS RSV 9.3 – I – 1200	№ 1077
		2017



1. Diverter switch oil vessel
2. Diverter switch
3. Opening for temperature sensor
4. Selector with reverser
5. Protective membrane
6. Position indicator
7. Incoming shaft at right side driving
8. Bleeding of the OLTC
9. Disposal of the openings for fixing to the transformer tank
10. Current take-off terminal
11. Incoming shaft at left side driving
12. Lifting hook 4xø35 mm
13. Disposal of the openings for "fork" mounting

NOTE: Additional information about Q1,Q2,Q3,Q4,Q5: dwg. N°999

HYUNDAI HEAVY INDUSTRIES CO. BULGARIA	ON LOAD TAP CHANGER RSV 9.3 – I – 1200-245/P-10.19.3 W	№ 1080
19		2017

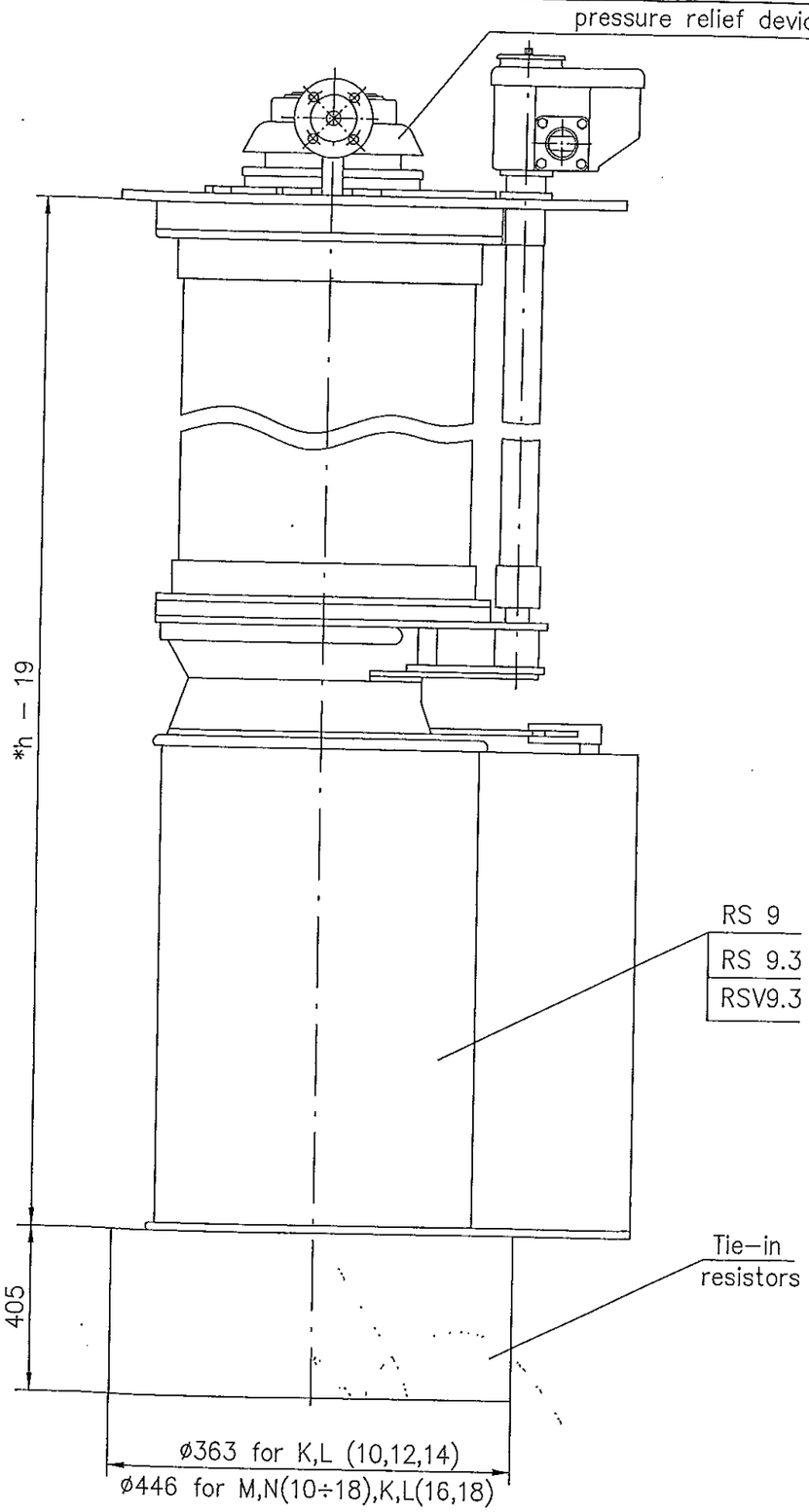


1. Diverter switch oil vessel
2. Diverter switch
3. Bleeding of the OLTC
3a. Bleeding of the transformer
4. Opening for temperature sensor
5. Selector with reverser
6. Selector with corse change-over selector
7. Lifting hook ø35mm
8. Protective membrane
9. Position indicator
10. Incoming shaft at right side driving
11. Current take-off terminal
12. Disposal of the openings for fixing to the transformer tank
13. Disposal of the openings for "fork" mounting
14. Incoming shaft at left side driving

NOTE: Additional information about Q1,Q2,Q3,Q4,Q5: dwg. N°999

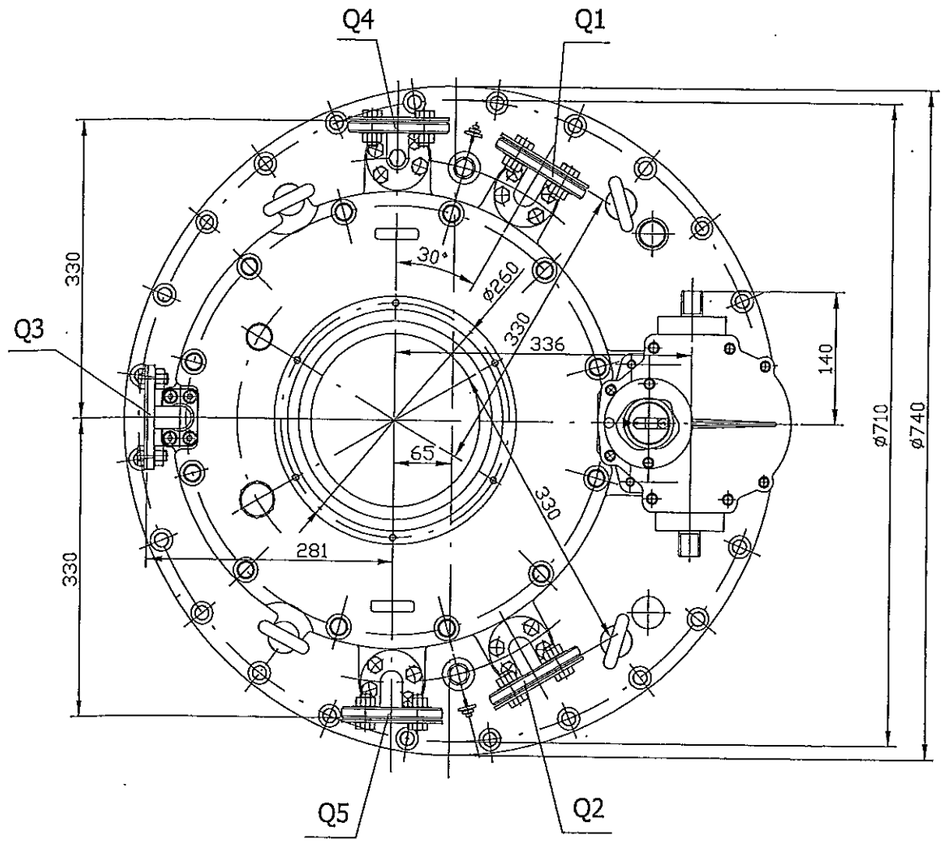
	RSV9.3 I 1500-72.5...245/L				RSV9.3 I 1500-72.5...245/N			
	Number of contacts per phase 10,12,14,16,18							
	Um (Insulation to Earth) in kV							
	72.5	123	170	245	72.5	123	170	245
h	1817	1866	2016	2216	1992	2041	2191	2391
a	1041	1090	1240	1440	1041	1090	1240	1440
b	776				951			
n	170				240			
t	115				150			
p	663				838			
q	213				283			
G	248÷260 kg				258÷270 kg			

HYUNDAI HEAVY INDUSTRIES CO. BULGARIA	ON LOAD TAP CHANGER RSV 9.3 – I – 1500	№ 1084
		2017



*h – See Drawings in the RS9/RS9.3/RSV9.3 Technical Data Catalogs

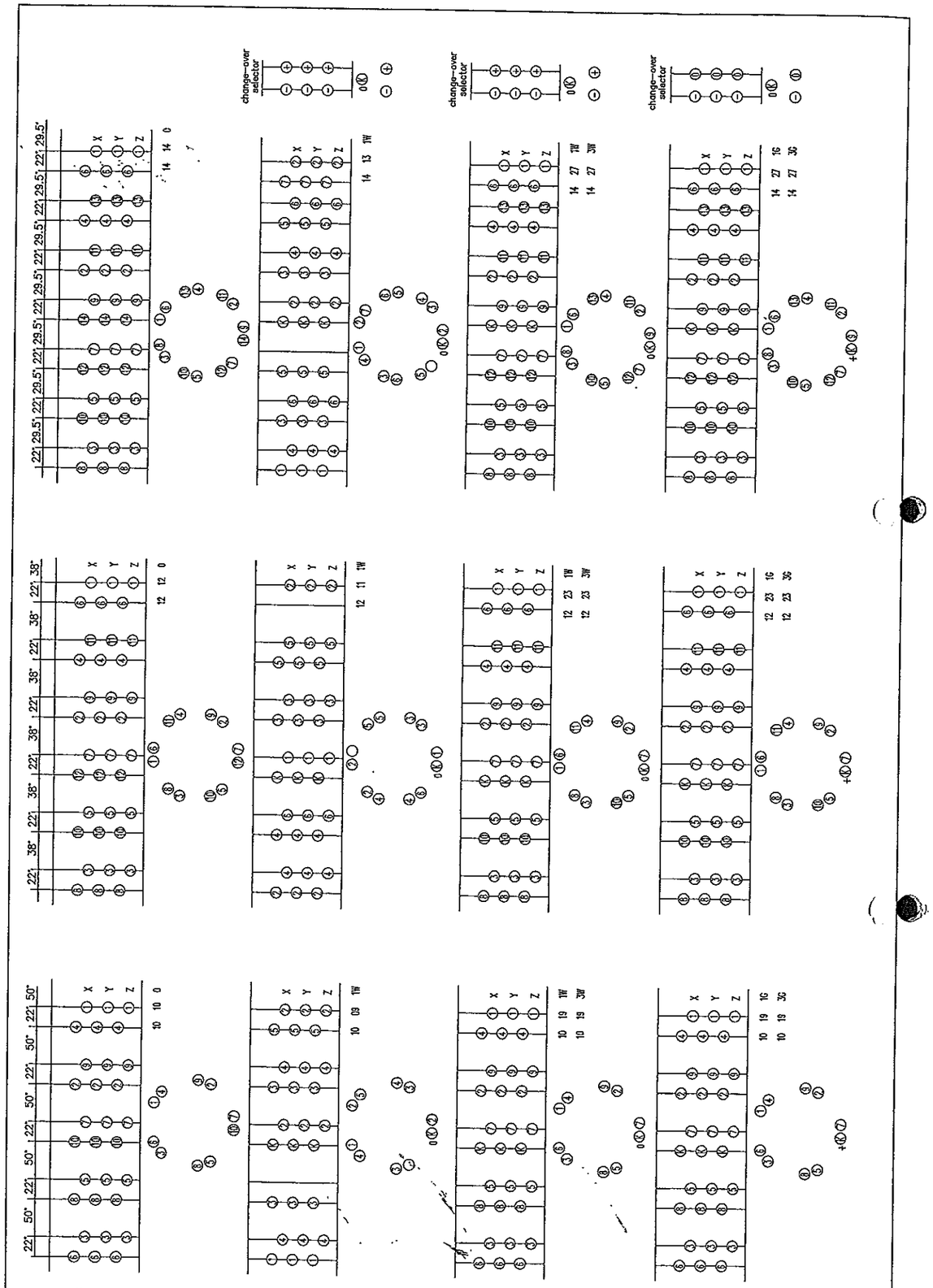
HYUNDAI HEAVY INDUSTRIES CO. BULGARIA	ON LOAD TAP CHANGER RS 9/RS 9.3/RSV 9.3 WITH PRESSURE RELIEF DEVICE AND TIE-IN RESISTORS	№ 310.Q
		2017



Q1, Q2 - FLANGE FOR A PROTECTIVE RELAY OR AN OIL FILTER (ROTATING)
Q3 - FLANGE FOR A PROTECTIVE RELAY OR AN OIL FILTER (NON-ROTATING)
Q4, Q5 - FLANGE FOR A SIPHON OR PROTECTIVE RELAY.

NOTE: IN THE ORDER SPECIFICATION SHEET, PLEASE FILL IN THE DESIGNATION SYMBOLS OF THE CONNECTING FLANGES (Q1,Q2,Q3,Q4,Q5) WHICH YOU HAVE SELECTED FOR YOUR ORDER.

HYUNDAI HEAVY INDUSTRIES CO. BULGARIA	ON LOAD TAP CHANGERS RS 9.3/RSV 9.3/RS 7.3/RSV 7.3	№ 999
		2017

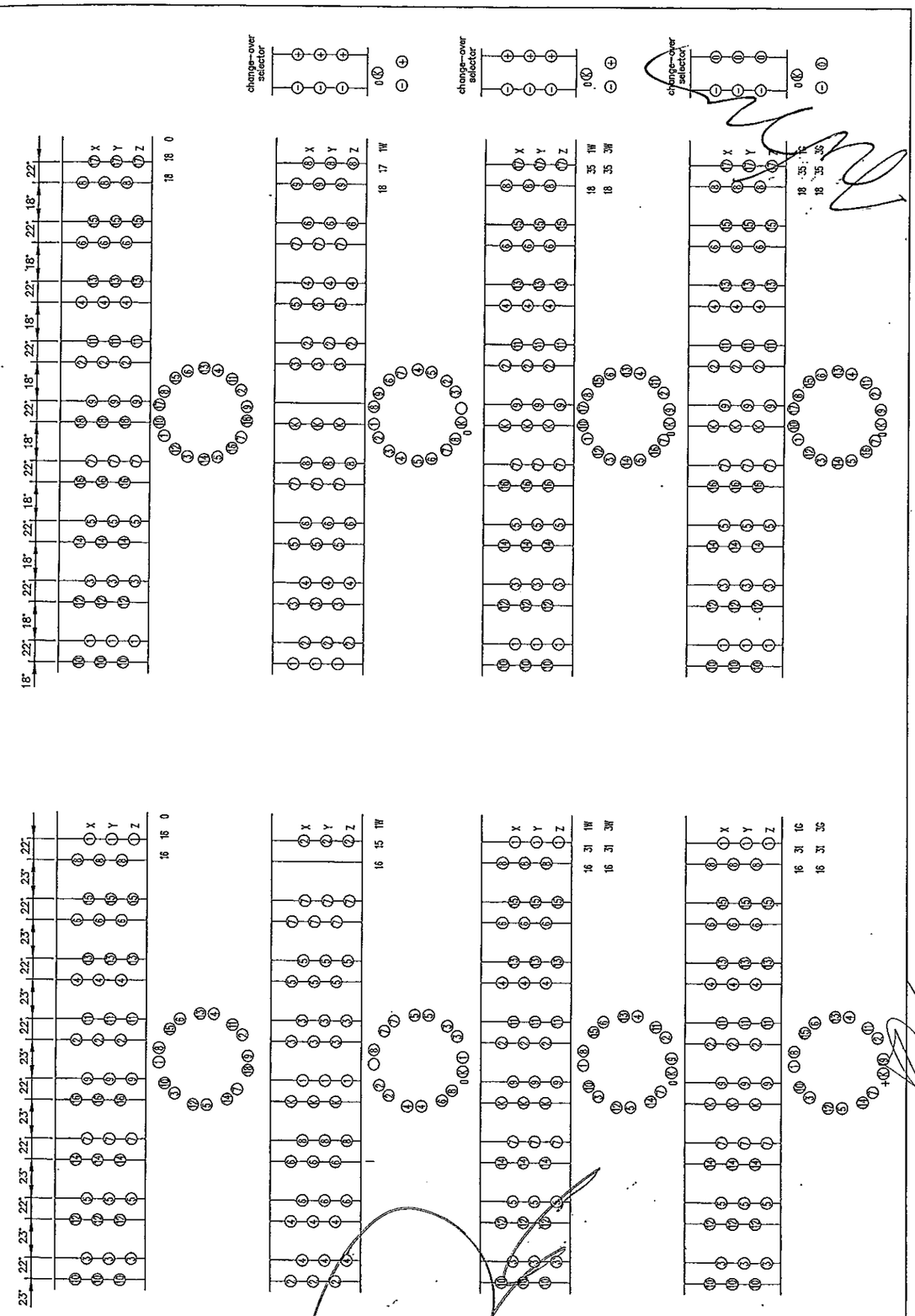


HYUNDAI HEAVY INDUSTRIES CO. BULGARIA

OLTC RS 9.3/RS 9 – III – 10, 12, 14
ARRANGEMENT OF TAP SELECTOR TERMINALS

№ 374

2017

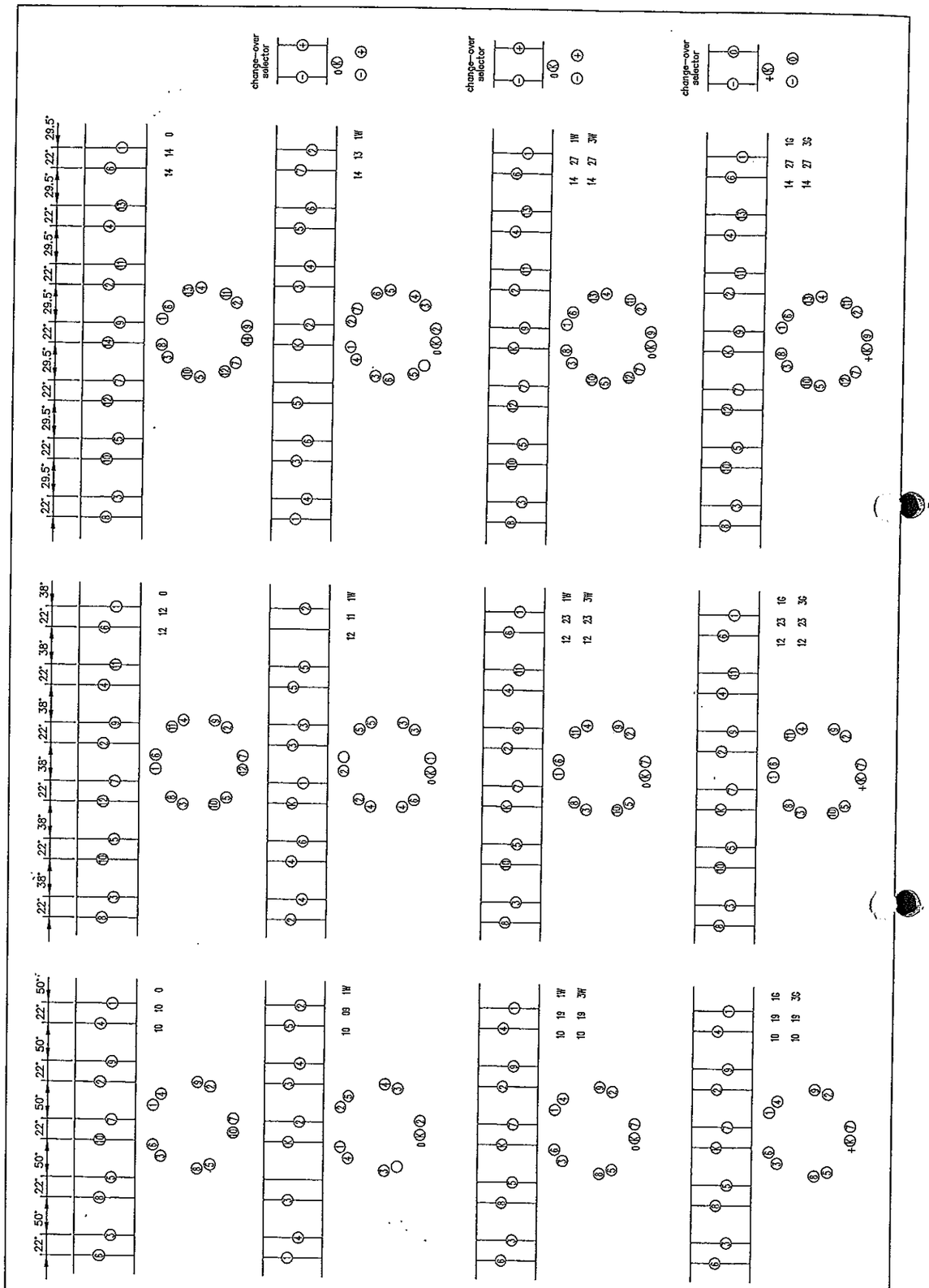


HYUNDAI HEAVY INDUSTRIES CO. BULGARIA

OLTC RS 9.3/RS 9 – III – 16, 18
ARRANGEMENT OF TAP SELECTOR TERMINALS

№ 375

2017

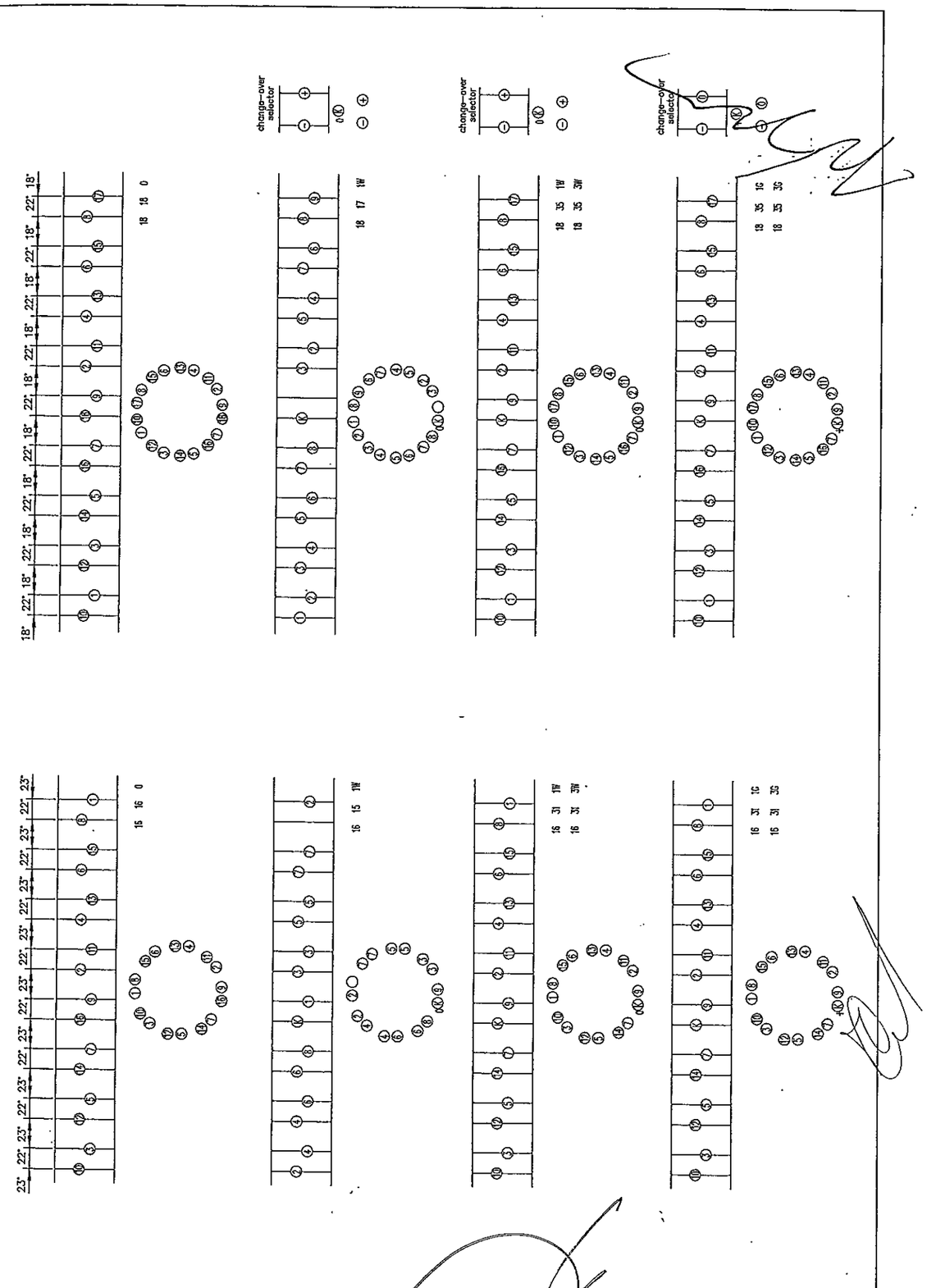


HYUNDAI
HEAVY INDUSTRIES CO. BULGARIA

OLTC RS 9.3/RS 9 – I – 10, 12, 14
ARRANGEMENT OF TAP SELECTOR TERMINALS

№ 376

2017



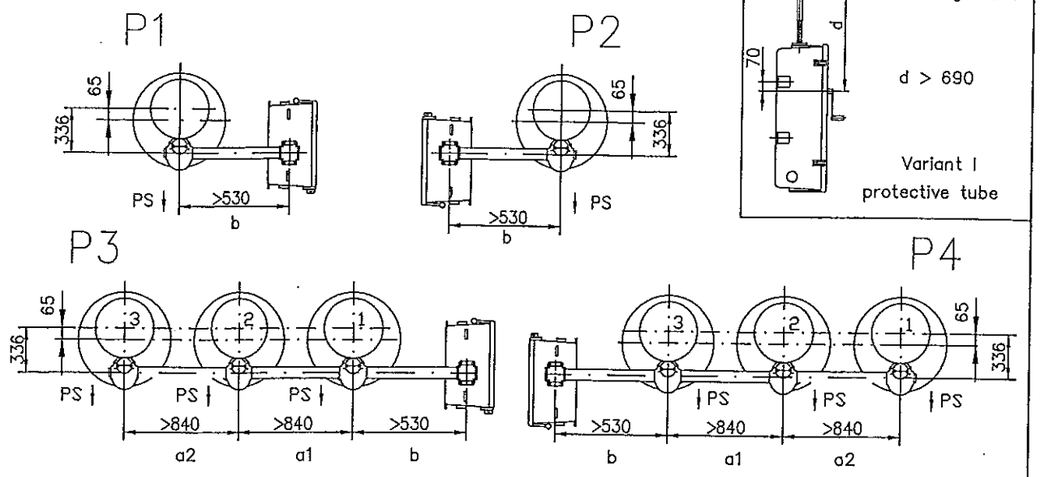
HYUNDAI
HEAVY INDUSTRIES CO. BULGARIA

OLTC RS 9.3/RS 9 – I – 16, 18
ARRANGEMENT OF TAP SELECTOR TERMINALS

№ 377

2017

STANDARD DESIGN

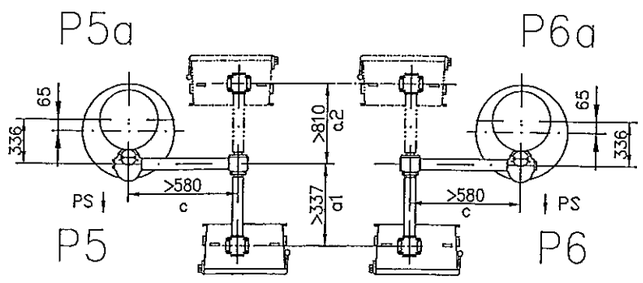


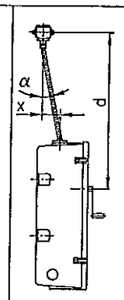
Vertical shaft arrangement

d > 690

Variant I
protective tube

SPECIAL DESIGN





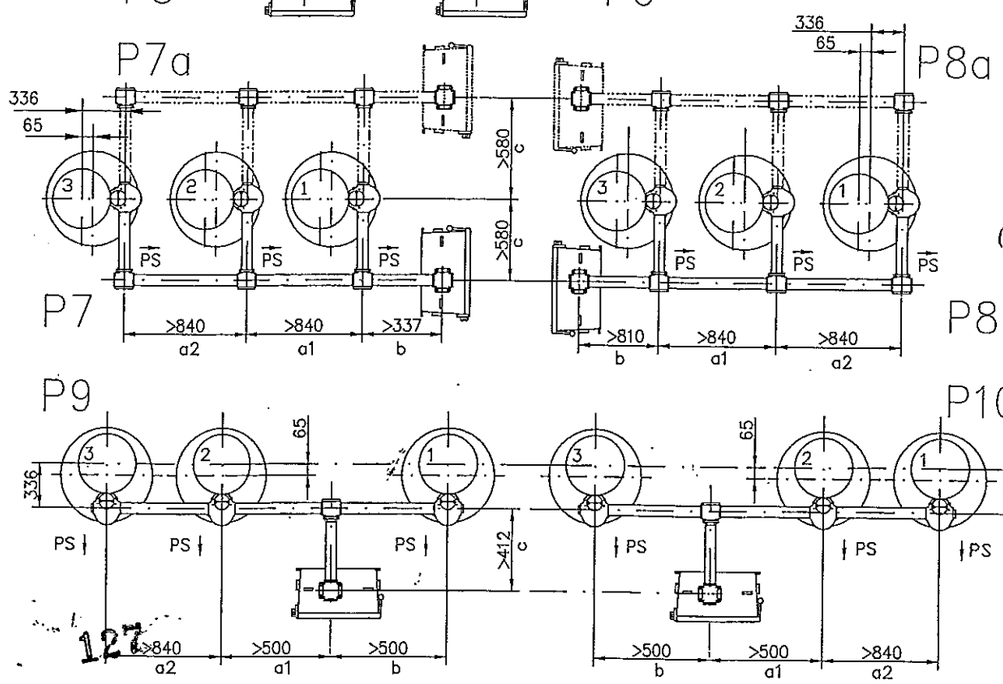
Vertical shaft arrangement

αmox = 25° (

x – declination

d > 690 (α = 25°)

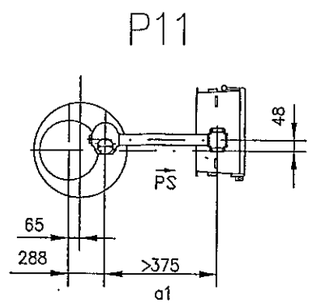
Variant II
protective cap

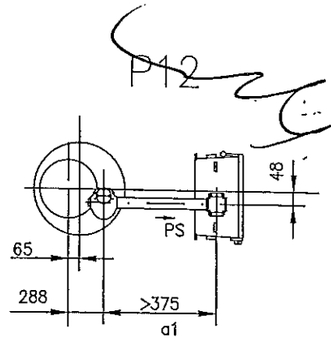


see notes on N'209.3 sheet 2

HYUNDAI HEAVY INDUSTRIES CO. BULGARIA	ON LOAD TAP CHANGER RS 9.3/RSV 9.3 DRIVING SHAFTS ARRANGEMENT	№ 209.3	
		2017	Sheet 1/2

SPECIAL DESIGN





CALCULATION (FORMULAS)

Arrangement / Lenght	P1	P2	P3	P4	P5	P5a	P6	P6a
La1	—	—	a1–345		a1–280	—	a1–280	—
La2	—	—	a2–345		—	a2–280	—	a2–280
Lb	b–315				—	—	—	—
Lc	—	—	—	—	c–386			
Ld	$\frac{d-582}{\cos\alpha}$; (α_{max}=25°)							

Arrangement / Lenght	P7	P7a	P8	P8a	P9	P10	P11	P12
La1	a1–280				a1–315			
La2	a2–280				a2–345		—	—
Lb	b–280				b–315		—	—
Lc	c–386				c–352		—	—
Ld	$\frac{d-582}{\cos\alpha}$; (α_{max}=25°)							

NOTES:

1. "L"–Driving shaft length
2. PS –Disposal of change–over selector
3. In case of two units – numbers 3 or 1 are omitted
4. Distances are determined for mechanical reasons.
   The insulating distances are not considered

HYUNDAI HEAVY INDUSTRIES CO. BULGARIA	ON LOAD TAP CHANGER RS 9.3/RSV 9.3 DRIVING SHAFTS ARRANGEMENT	№ 209.3	
		2017	Sheet 2/2